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ENERGY REVIEW IN AFRICA

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Table of Contents

		Para.	Page
I.	Introduction	1-3	1
II.	Energy Resources in Africa	4-10	1-2
III.	Production of energy in Africa	11-27	2-44
IV.	Consumption of energy in Africa	28-46	44-47
V.	Energy supply and demand outlook	47-58	48-49
VI.	Energy policy issues	59-75	49-54
VII.	Energy market in Africa	76-78	54
VIII.	Prospects for the future	79-84	55-56
IX.	Conclusions	85-86	56-57

I. Introduction

1. Energy problems remain serious in African countries despite a recent weakening in world energy prices. There is a continuing need for assistance to member States to help them to establish a coherent energy strategy, to prepare and obtain funding for urgent and high-priority investment projects and to identify the most pressing requirements for technical assistance.

2. Energy crisis of the seventies and soaring prices for basic energy carriers such as crude oil high-lighted the need of self-sufficiency in domestic energy production in African countries, the great majority of whom still heavily rely on import of energy. While oil prices soaring there has been a general regional scramble to explore for domestic energy resources and the ECA secretariat was called upon monitoring these activities. Although the increase in the oil prices has put a considerable strain on the balance of payments of the oil-importing African countries, it has also provided them with ample opportunity to tap additional reserves of commercial sources of energy (oil, natural gas, coal etc.) and to consider the expanded programmes for development of new and renewable sources of energy (NRSE).

3. Today many African countries depend entirely on petroleum imports for their energy needs, hence a progressively higher sum of foreign exchange is spent in order to secure the petroleum import for the energy requirements of African countries.

II. Energy sources in Africa

4. This section gives a general overview of the current situation regarding energy resources in Africa and also of the production and consumption of commercial energy for the period 1980-1983.

a. Reserves

5. Energy resources of Africa are immense and constitute a great share of the world energy resources . but unfortunately until now some of these resources are still inadequately surveyed. In real figures the reserves of energy sources in Africa are estimated as follows: 311.10 billion tons of coal, 57.8 billion barrels of crude oil, 189,423 billion cubic feet of natural gas, 1.35 million tons of uranium, 26,000 tons of thorium and 200,000 Mw of hydroelectric potential.

6. Estimates of reserves of non-commercial energy sources such as fuelwood, charcoal and bagasse ranged widely. It should be noted that the energy consumption pattern in rural areas is marked by the very high share of non-commercial (traditional) and the exceptionally low share of commercial sources of energy. The paper will elaborate on availability and consumption pattern of fuelwood despite the lack of data on this energy sources. Geothermal and solar energy may offer a partial solution to the energy problems in rural areas in some African countries.

7. Concerning solid fuel resources, coal being the major commodity, the African countries do not fully exploit these resources. In view of the present energy situation in Africa it is reasonable to expect that member States rich in coal and lignite will reserve a greater consideration in future to the exploration and development of their solid fuel resources.

8. Taken as a whole, hydrocarbons are still going to play an important role in the economics of African countries. With this in mind there should be a major regional effort to find and develop additional oil and gas fields. It is especially important that the oil-importing countries of Africa build the needed infrastructure to support hydrocarbon exploration and development.

9. Africa has significant reserves of oil shales and tar sands which are far from being fully known. The greatest share of this reserves are concentrated in Morocco, Zaire and Madagascar.

10. Another sources of energy which deserves a special attention is uranium which although mined in Africa, has yet to be used as a sources of energy in African countries.

III. Production of energy in Africa

11. Production of commercial energy in Africa registered the peak on 1980 (401.5 MTOE), but in the following years a sharp decrease was observed and in 1983 it dropped to 342.0 MTOE. This considerable drop of commercial energy production reflected the overall decrease in energy production in

12. During the sixties total energy production in Africa exhibited the average annual growth about 22.7 percent, in seventies this growth declined substantially to 1.2 percent only.

13. Production and trade of commercial energy in Africa (by country) is summarized in the table 1.

14. Production of hydrocarbons in Africa is closely related to the reserves of oil and natural gas in the oil-producing countries.

15. Reserves of oil and natural gas in Africa constitute a great share of the World resources. In real figures they are estimated as follows: 5.7 billion barrels of crude oil and 189,423 billion cubic feet of natural gas (Table 2). Taken as a whole the hydrocarbons are still going to play an important role in the economics of African countries. With this in mind there should be a major regional effort to find and develop additional oil and gas fields. It is especially important that the oil-importing developing countries of Africa build the need infrastructure to support hydrocarbon exploration and development in Africa.

Table 2

Estimated proved reserves of oil and Natural Gas in Africa (as per 1-1-1983)

Country	Oil (1,000 bbl)	Natural Gas 10^9 cu. ft)
Algeria	9,440,000	111,250
Angola	1,635,000	1,470
Cameroon	530,000	4,450
Congo	1,550,000	2,700
Egypt	3,325,000	7,180
Gabon	460,000	485
Ghana	5,400	-
Ivory Coast	110,500	3,040
Libya	21,500,000	21,500
Morocco	290	-
Nigeria	16,750,000	32,400
South Africa	116,500	400
Sudan	400,000	-
Tanzania	-	200
Tunisia	1,860,000	4,300
Zaire	139,000	48
Total	57,821,690	189,423

Source: International Petroleum Encyclopedia, 1983

Production and Trade of Commercial Energy (Table 1)

(Quantities in thousand metric tons and in kilograms per capita of oil equivalent)

Country or area	Year	Primary Energy Production					Changes in Stocks	Imports	Exports	Bunkers		
		Total	Solids	Liquids	Gas	Electricity				Air	Sea	Un-allocated
Algeria	1980	70234	5	52393	17815	21	2502	1638	48164	259	417	3493
	1981	58897	5	47005	11856	31	-1165	890	45606	350	406	4255
	1982	59709	5	47519	12153	33	-1219	823	46920	358	395	6284
	1983	58509	5	46372	12102	30	1715	827	42578	358	363	5496
Angola	1980	7591	..	7428	70	93	0	158	6332	66	313	322
	1981	7333	..	7158	82	93	0	140	5986	69	333	300
	1982	6592	..	6410	82	100	0	109	5398	66	313	230
	1983	8507	..	8304	94	109	...	56	6922	65	372	486
Benin	1980	..	..	..	..	..	10	153	16	4	..	..
	1981	..	..	..	..	..	-21	111	6	2	..	..
	1982	..	..	..	..	..	-4	128	6	3	..	..
	1983	..	..	..	..	..	0	135	6	4	..	..
Burkina Faso	1980	..	..	..	..	..	...	142	1	..	..	..
	1981	..	..	..	..	..	...	136	1	..	..	..
	1982	..	..	..	..	..	...	134	0	..	..	..
	1983	..	..	..	..	..	...	141	1	..	..	..
Burundi	1980	1	1	..	..	..	0	38	..	1	..	..
	1981	2	2	..	..	..	2	55	..	2	..	..
	1982	3	3	..	..	..	1	47	..	1	..	..
	1983	3	3	..	..	..	1	50	..	1	..	..
Cameroon	1980	2815	...	2700	..	115	248	606	1612	63	...	72
	1981	4153	...	4000	..	153	181	417	1434	32	...	214
	1982	4903	...	4750	..	153	-42	80	1872	35	...	342
	1983	5752	...	5608	..	144	518	52	1950	38	...	489
Cape Verde	1980	..	..	..	..	..	21	126	0	0	74	..
	1981	..	..	..	..	..	21	125	0	0	74	..
	1982	..	..	..	..	..	4	99	0	0	62	..
	1983	..	..	..	..	..	4	102	0	0	67	..

Country or area	Year	Primary Energy Production					Changes in Stocks	Imports	Exports	Bunkers		Unallocated
		Total	Solids	Liquids	Gas	Electricity				Air	Sea	
Central African Republic	1980	5	..	..	..	5	1	63	..	5	..	..
	1981	5	..	..	..	5	1	61	..	5	..	..
	1982	5	..	..	..	5	1	66	..	6	..	..
	1983	5	..	..	..	5	0	70	..	7	..	
Chad	1980	..	..	..	..	..	0	91	...	21	..	..
	1981	..	..	..	..	..	0	91	...	21	..	..
	1982	..	..	..	..	..	0	89	...	21	..	..
	1983	..	..	..	..	..	1	91	...	23	..	..
Comoros	1980	..	..	..	..	..	..	12	..	..	..	..
	1981	..	..	..	..	..	..	12	..	..	..	..
	1982	..	..	..	..	..	..	12	..	..	..	..
	1983	..	..	..	..	..	..	12	..	..	..	..
Congo	1980	3176	..	3168	0	8	65	110	3104	10	...	3
	1981	4291	..	4283	0	8	180	106	4104	10	...	2
	1982	4495	..	4281	0	14	80	112	4403	10	...	1
	1983	5379	..	5365	0	14	200	114	5163	11	...	5
Djibouti	1980	..	..	..	..	..	...	488	..	73	192	..
	1981	..	..	..	..	..	...	456	..	60	275	..
	1982	..	..	..	..	..	...	478	..	66	266	..
	1983	..	..	..	..	..	...	494	..	72	269	..
Egypt	1980	31618	..	29838	951	829	7147	1319	9414	162	1006	1354
	1981	31958	..	29840	1254	864	6717	2162	8805	173	1259	1463
	1982	35469	..	33221	1369	880	8232	2451	8741	158	1652	2220
	1983	38841	..	36451	1392	998	8000	2289	11102	144	1672	2395
Equatorial Guinea	1980	0	..	..	..	0	1	19	..	..	..	..
	1981	0	..	..	..	0	1	23	..	..	..	..
	1982	0	..	..	..	0	0	25	..	..	..	..
	1983	0	..	..	..	0	0	26	..	..	..	..
Ethiopia	1980	40	..	..	..	40	35	843	160	15	3	83
	1981	43	..	..	..	43	110	933	164	30	4	160
	1982	49	..	..	..	49	74	955	205	40	4	30
	1983	48	..	..	..	48	27	888	248	16	10	58

Country or area	Year	Primary Energy Production					Changes in Stocks	Imports	Exports	Bunkers		
		Total	Solids	Liquids	Gas	Electricity				Air	Sea	Un-allocated
Gabon	1980	9056	..	8895	139	22	0	41	8373	17	68	51
	1981	7763	..	7600	141	22	0	25	6789	10	93	62
	1982	7910	..	7748	141	22	200	31	6487	21	100	239
	1983	8093	..	7920	141	22	0	27	7073	10	99	160
Gambia	1980	..	..	..	..	..	..	55	3	..	..	..
	1981	..	..	..	..	..	..	54	3	..	..	..
	1982	..	..	..	..	..	..	57	4	..	..	..
	1983	..	..	..	..	..	..	56	4	..	..	..
Ghana	1980	534	..	88	..	446	9	1031	408	39	30	41
	1981	515	..	63	..	452	0	1096	367	31	30	74
	1982	457	..	39	..	418	0	1044	309	23	31	111
	1983	286	..	70	..	216	30	1051	248	23	15	184
Guinea	1980	7	..	..	..	7	...	286	..	3	...	..
	1981	7	..	..	..	7	...	282	..	2	...	..
	1982	7	..	..	..	7	...	287	..	3	...	..
	1983	7	..	..	..	7	...	291	..	3	...	..
Ivory Coast	1980	234	..	120	..	114	411	1964	544	52	2	68
	1981	537	..	389	..	148	54	1580	654	48	5	230
	1982	903	..	757	..	146	961	1639	371	50	8	19
	1983	1304	..	1158	..	146	716	1620	740	51	6	173
Kenya	1980	90	..	..	..	90	-82	3389	1127	257	188	422
	1981	120	..	..	..	120	-638	2876	1097	296	145	571
	1982	126	..	..	..	126	-2	2533	867	129	141	243
	1983	147	..	..	..	147	0	2206	629	228	13	241
Liberia	1980	25	..	..	..	25	10	654	2	56	59	35
	1981	25	..	..	..	25	15	651	2	55	54	39
	1982	25	..	..	..	25	10	661	2	57	60	31
	1983	25	..	..	..	25	10	656	2	56	62	29
Libyan Arab Jamahiriya	1980	92900	..	89746	3153	..	383	633	85664	172	49	2241
	1981	62636	..	60163	2473	..	1847	1558	53011	172	49	2709
	1982	66769	..	56812	9957	..	1510	1524	50188	142	49	2437
	1983	63226	..	54203	9023	..	100	1577	48835	162	49	2525

Country or area	Year	Primary Energy Producti		
		Total	Solids	Liq
Madagascar	1980	13	..	
	1981	13	..	
	1982	19	..	
	1983	21	..	
Malawi	1980	34	..	
	1981	34	..	
	1982	35	..	
	1983	39	..	
Mali	1980	4	..	
	1981	4	..	
	1982	4	..	
	1983	4	..	
Mauritania	1980	..	..	
	1981	..	..	
	1982	..	..	
	1983	..	..	
Mauritius	1980	7	..	
	1981	5	..	
	1982	8	..	
	1983	8	..	
Morocco	1980	670	468	
	1981	677	484	
	1982	641	506	
	1983	700	562	
Mozambique	1980	1421	275	
	1981	524	241	
	1982	514	261	
	1983	770	261	
Niger	1980	14	14	
	1981	21	21	
	1982	31	31	
	1983	30	30	

n						Bunkers		
ids	Gas	Electricity	Changes in Stocks	Imports	Exports	Air	Sea	Un-allocated
..	..	13	0	730	110	5	18	30
..	..	13	22	577	91	4	18	-5
..	..	19	67	601	95	5	21	10
..	..	21	44	607	70	3	19	112
..	..	34	...	216	0	10	..	..
..	..	34	...	198	0	10	..	..
..	..	35	...	188	0	9	..	..
..	..	39	0	175	0	9	..	..
..	..	4	...	141	..	5	..	..
..	..	4	...	133	..	5	..	..
..	..	4	...	140	..	5	..	..
..	..	4	...	143	..	5	..	..
..	..	..	...	211	..	10	..	..
..	..	..	...	206	..	10	..	..
..	..	..	...	212	..	10	..	..
..	..	..	...	212	..	10	..	..
..	..	7	-10	307	0	54	54	..
..	..	5	13	278	0	61	18	..
..	..	8	0	277	0	55	39	..
..	..	8	0	279	0	56	39	..
14	62	127	-251	4244	97	233	38	400
18	87	88	359	4705	42	223	17	450
15	71	49	33	4643	41	206	20	636
16	73	48	25	4604	74	205	29	398
..	..	1146	0	895	1017	25	84	117
..	..	283	0	782	354	27	79	44
..	..	253	0	794	292	25	88	53
..	..	509	0	819	535	23	103	53
..	..	..	...	178	..	8	..	..
..	..	..	...	189	..	10	..	..
..	..	..	...	198	..	10	..	..
..	..	..	...	212	..	10	..	..

Country or area	Year	Primary Energy Production			G
		Total	Solids	Liquids	
Nigeria	1980	105757	121	104190	1
	1981	76161	80	71192	4
	1982	68736	43	63800	4
	1983	66552	28	61150	5
Réunion	1980	26	..	..	
	1981	32	..	..	
	1982	36	..	..	
	1983	36	..	..	
Rwanda	1980	14	..	..	
	1981	14	..	..	
	1982	14	..	..	
	1983	14	..	..	
St. Helena	1980	...	...	..	
	1981	...	...	..	
	1982	...	...	..	
	1983	...	...	..	
Sao Tome-Principe	1980	0	..	..	
	1981	0	..	..	
	1982	0	..	..	
	1983	0	..	..	
Senegal	1980	..	..	..	
	1981	..	..	..	
	1982	..	..	..	
	1983	..	..	..	
Seychelles	1980	..	..	..	
	1981	..	..	..	
	1982	..	..	..	
	1983	..	..	..	
Sierra Leone	1980	...	..	..	
	1981	...	..	..	
	1982	...	...	..	
	1983	...	..	..	

s	Electricity	Changes in Stocks	Imports	Exports	Bunkers		
					Air	Sea	Un-allocated
13	233	1140	337	97237	6	79	77
93	196	0	206	64902	6	98	262
93	199	-500	142	57410	6	98	541
63	211	0	13	54194	14	147	519
..	26	14	243	...	1	..	..
..	32	6	233	...	8	..	..
..	36	2	258	...	12	..	..
..	36	2	260	...	10	..	..
1	13	...	53	0	4	..	..
1	13	...	70	0	10	..	..
1	13	...	67	0	8	..	..
1	13	...	68	0	8	..	..
..	..	..	0	..	..	..	..
..	..	..	2	..	..	..	..
..	..	..	1	..	..	..	..
..	..	..	1	..	..	..	..
..	0	...	11	..	..	..	..
..	0	...	11	..	..	..	..
..	0	...	11	..	..	..	..
..	0	...	11	..	..	..	..
..	..	0	1375	153	177	265	24
..	..	21	1323	129	131	246	12
..	..	0	1528	122	221	319	65
..	..	0	1040	98	127	120	15
..	..	-5	68	..	22	11	..
..	..	-3	61	..	10	14	..
..	..	1	56	..	8	15	..
..	..	0	76	..	13	23	..
..	...	...	338	1	10	76	65
..	...	...	399	1	11	75	87
..	...	...	351	1	13	72	100
..	...	...	364	1	12	72	121

ENERGY/UD/3/95

Country or area	Year	Primary Energy Production					Changes in Stocks	Imports	Exports	Bunkers		Un-allocated
		Total	Solids	Liquids	Gas	Electricity				Air	Sea	
Somalia	1980	...	..	..	..	..	54	533	93	30	30	24
	1981	...	..	..	..	..	44	544	73	30	30	5
	1982	...	..	..	..	..	50	535	64	25	32	4
	1983	...	..	..	..	..	35	519	56	20	25	18
S.Africa Customs U	1980	64318	64222	..	..	96	-498	16824	16181	71	3083	301
	1981	72277	74125	..	..	153	2000	18027	16327	76	3425	1822
Un.	1982	70440	70345	..	..	95	2000	16390	14394	101	3525	495
	1983	72825	72763	..	..	62	3005	15428	15429	122	3332	-2328
Sudan	1980	42	..	..	..	42	15	1182	15	22	...	120
	1981	42	..	..	..	42	20	1320	53	22	...	136
	1982	43	..	..	..	43	20	1264	55	23	...	42
	1983	43	..	..	..	43	20	1277	49	20	...	123
Togo	1980	1	0	..	..	1	-50	504	340	..	...	15
	1981	2	0	..	..	2	-200	413	308	..	...	11
	1982	2	0	..	..	2	-160	457	234	..	...	14
	1983	2	0	..	..	2	0	436	220	..	...	-164
Tunisia	1980	6019	..	5627	390	2	292	2002	4616	85	7	213
	1981	5836	..	5407	427	2	415	2868	4993	114	22	197
	1982	5601	..	5146	452	3	209	1651	3756	59	53	212
	1983	5993	..	5578	412	3	179	1743	4232	66	44	230
Uganda	1980	54	..	..	..	54	0	220	29	0	..	...
	1981	55	..	..	..	55	0	182	18	0	..	...
	1982	56	..	..	..	56	0	200	20	0	..	...
	1983	54	..	..	..	54	0	204	19	0	..	....
United Rep. Tanzania	1980	46	1	..	..	45	0	649	57	6	39	15
	1981	47	1	..	..	47	0	658	34	5	19	36
	1982	48	1	..	..	47	0	693	46	7	24	44
	1983	46	1	..	..	46	0	694	47	7	24	48
Western Sahara	1980	..	..	..	..	..	...	56	..	3	0	..
	1981	..	...	..	..	..	...	55	..	3	0	..
	1982	..	..	..	..	..	...	61	..	3	0	..
	1983	..	..	..	..	...	...	59	..	3	0	..
Zaire	1980	1465	95	1023	..	347	0	895	886	91	24	6
	1981	1491	96	1048	..	347	-10	897	826	91	29	38
	1982	1591	83	1145	..	364	35	871	822	93	27	33
	1983	1588	89	1148	..	351	8	851	838	91	30	9

Country or area	Year	Primary Energy Production					Changes in Stocks	Imports	Exports	Bunkers		Un-allocated
		Total	Solids	Liquids	Gas	Electricity				Air	Sea	
Zambia	1980	1106	336	..	..	770..	-45	777	313	35	..	14
	1981	1121	294	..	..	827	-20	775	304	35	..	-19
	1982	1197	350	..	..	847	10	715	311	27	..	4
	1983	1111	262	..	..	849	-19	715	301	27	..	-1
Zimbabwe	1980	2243	1904	..	..	339	0	915	229	56	..	...
	1981	1973	1624	..	..	348	0	998	151	61	..	...
	1982	1958	1653	..	..	305	0	912	125	64	..	...
	1983	1960	1644	..	..	316	..	888	141	66	..	...
AFRICA	1980	401583	67441	305231	23795	5117	11417	47796	286298	2249	6210	9606
	1981	338614	74973	238166	21014	4462	9971	49979	216612	2345	6816	13270
	1982	338400	73280	231842	28919	4359	11573	46634	203562	2192	7415	14444
	1983	341918	75647	233343	28400	4528	14620	44558	201806	2217	7002	11391
Guinea Bissau	1980	..	..	..	..		0	30	...	...	..	..
	1981	..	..	..	..		0	29	...	...	..	..
	1982	..	..	..	..		...	29	...	...	..	..
	1983	..	..	..	..		...	29	...	...	..	..

16. There is a growing awareness on the part of African oil producing countries, multinational oil companies and financial institutions that existing oil and gas reserves must be developed and the discovery of potential new reserves must also go ahead. There has been a welcome move towards greater realism on all sides, borne of the common understanding that despite the current lull in oil market, hard work needs to be done in Africa to secure energy resources over the long term. It is in the interest of African member States to encourage petroleum exploration, given the projected climb in their consumption - perhaps a doubling by the year 2000 - as they move further along the path of economic development (with population growth, increasing urbanization and, in many subsaharan countries, diminishing supplies of traditional or non commercial sources of energy). It is in the interest of the Africa's economy as a whole to provide an adequate supply of energy.

17. Historically for the oil-importing African countries, petroleum exploration and development was a straight forward problem of import substitution - substituting imports of oil, which have become expensive with cheaper domestic production. Although there was always some exploration going on in most African countries even during the years of low oil prices, interest was greately spurred on after oil prices began to rise in the seventies, under the pressure of sustained rates of high growth in Africa's demand for energy that increase wide surge in exploration and development.

18. In Africa, major efforts were undertaken in Algeria, Angola, Egypt, Libya and Nigeria which were already substantial producers and have been able through intensive exploration and drilling programme to increase their production several-fold. Some of the African countries produced very little or nothing that time (Benin, Cameroon, Congo, Ghana, Ivory Coast and Zaire).

19. However, oil exploration ventures in some African countries without an established oil industry represented a long-term commitments. For instance the first oil exploration well in Chad was drilled in 1973 and now the operators are working on the twenty-second exploration well. So far not one drop of oil has reached the market and inevitably it will be some years before it happens.

20. The similar story happen to the Sudan where since 1977 more than 50 exploration wells have been drilled but not a single barrel of oil was produced. In this case the available infrastructure should be greatly improved before the commercial production of oil could be realized.

21. To the contrary in 1984 Gabon announced a major improvement in its economy which could be attributed to almost total dependence on oil production and export. Total oil industry turn-over in 1984 increased by 23.6 percent boosting Gross Domestic Product to US$2.3 billion.

Table 3

Production and export of oil and production of natural gas in Africa in 1983

Country	Oil, million ton: Production 1983	Oil, million ton: Export 1983	Oil, million ton: Production 1984 (Preliminary)	Natural Gas, billion cubic meter
Algeria	34.2* / 31.3**	13.5	n.a	23.2
Angola	8.7 / 9.1	n.a	12.5**	0.23
Cameroon	5.9 / 6.2	5.0	8.0	-
Congo	4.7 / 5.4	4.8	6.0	n.a
Egypt	34.5 / n.a	n.a	n.a	2.4
Gabon	7.5 / 7.9	6.7	8.8	0.1
Libya	51.0 / n.a	n.a	n.a	4.3
Morocco	n.a	n.a	n.a	0.1
Nigeria	61.6 / 62.1	53.0	70.0	1.9
Tunisia	5.7 / 5.3	3.9	5.5	0.4
Zaire	1.3 / 1.3	1.2	1.6	-
Ivory Coast	1.2 / 1.0	n.a	1.1	-

Source: * International Petroleum Encyclopedia, 1984.

** La lettre Afrique énergies, June, 1985.

Production, Trade and Consumption of Crude Petroleum (Table 4)

(Quantities in thousand metric tons and in kilograms per capita)

Country or area	Year	Production	of which: off-shore	Imports	Exports	Changes in stocks	Consumption Total	Consumption Per Capita
Algeria	1980	47358	..	*0	33224	2464	11670	625
	1981	36943	..	*0	24164	-2131	14910	774
	1982	33542	..	0	13472	-930	21000	1055
	1983	*31588	..	0	*10588	1000	20000	972
Angola	1980	*7428	*6204	..	*6204	0	1224	158
	1981	*7158	*5858	..	*5858	0	1300	164
	1982	*6410	*5245	..	*5300	0	1110	136
	1983	*8304	*6800	..	*6800	...	1504	180
Cameroon	1980	2700	2700	..	1612	248	840	98
	1981	*4000	*4000	..	1434	181	2385	272
	1982	*4750	*4750	..	1872	8	2870	319
	1983	*5608	*5608	..	1950	458	3200	347
Congo	1980	3168	1940	..	*3100	65	3	2
	1981	4283	2487	..	4101	180	2	1
	1982	4481	2809	..	*4400	80	1	1
	1983	5365	3348	..	*5160	200	5	3
Egypt	1980	29400	24054	*0	8007	7147	14246	345
	1981	29405	*26000	*0	7138	6717	15500	366
	1982	32772	*27000	*0	7060	8232	17480	403
	1983	35957	*28000	*0	*9237	8000	18720	420
Ethiopia	1980	..	..	636	..	35	601	19
	1981	..	..	750	..	110	640	20
	1982	..	..	749	..	74	675	20
	1983	..	..	755	..	17	738	21
Gabon	1980	8895	7800	..	7687	0	1208	1125
	1981	7600	*6500	..	*6300	0	1300	1192
	1982	7748	*6800	..	6098	200	1450	1309
	1983	*7920	*6810	..	*6720	0	1200	1065
Ghana	1980	88	88	1030	*73	9	1030	90
	1981	63	63	1095	0	0	1158	98
	1982	*39	39	1043	0	0	1082	89
	1983	*70	*70	*1050	*0	30	1090	86
Ivory Coast	1980	*120	..	1659	*120	350	1309	159
	1981	*389	..	1343	200	0	1532	179
	1982	757	..	1427	97	803	1284	145
	1983	*1158	..	*1410	*350	508	1710	187

Country or area	Year	Production		Imports	Exports	Changes in stocks	Consumption	
		Total	of which: off-shore				Total	Per Capita
Kenya	1980	..	..	*3076	..	0	3076	183
	1981	..	..	*2621	..	0	2621	150
	1982	..	..	*2163	..	0	2163	119
	1983	..	..	*1940	..	0	1940	102
Liberia	1980	..	..	*653	..	10	643	344
	1981	..	..	*650	..	15	635	329
	1982	..	..	*660	..	10	650	326
	1983	..	..	*655	..	10	645	314
Libyan Arab Jamahiriya	1980	88324	..	..	81800	383	6141	2065
	1981	58726	..	..	51237	1847	5642	1824
	1982	55380	..	..	48170	1510	5700	1772
	1983	*52506	..	..	*46606	100	5800	1735
Madagascar	1980	..	..	*500	..	-50	550	63
	1981	..	..	*360	..	0	360	40
	1982	..	..	*370	..	0	370	40
	1983	..	..	*400	..	90	310	33
Morocco	1980	14	..	4001	..	-200	4215	210
	1981	18	..	4476	..	347	4147	200
	1982	15	..	4408	..	107	4316	202
	1983	*16	..	*4384	..	10	4390	199
Mozambique	1980	..	..	*600	..	0	600	50
	1981	..	..	500	..	0	500	40
	1982	..	..	*520	..	0	520	40
	1983	..	..	*530	..	0	580	44
Nigeria	1980	104190	*25000	..	96760	1140	6290	78
	1981	71192	*17000	..	64392	0	6800	82
	1982	63800	*15000	..	*56900	-500	7400	86
	1983	61150	*16000	..	53650	0	7500	84
Senegal	1980	..	..	749	..	...	749	131$
	1981	..	..	685	..	...	685	117
	1982	..	..	770	..	...	770	128
	1983	..	..	292	..	...	292	47
Sierra Leone	1980	..	..	*210	..	...	210	64
	1981	..	..	*280	..	...	280	84
	1982	..	..	*285	..	...	285	84
	1983	..	..	*290	..	...	290	84
Somalia	1980	..	..	*400	..	54	346	75
	1981	..	..	*410	..	44	366	75
	1982	..	..	*420	..	50	370	73
	1983	..	..	*395	..	35	360	68

Country or area	Year	Total	of which: off-shore	Imports	Exports	Changes in stocks	Consumption Total	Consumption Per Capita
S. Africa Customs Union	1980	..	..	*15000	..	2000	13000	397
	1981	..	..	*17000	..	2000	15000	447
	1982	..	..	*16200	..	2000	14200	412
	1983	..	..	*15000	..	3000	12000	340
Sudan	1980	..	..	*1100	..	15	1085	58
	1981	..	..	*1150	..	20	1130	59
	1982	..	..	*1120	..	20	1100	56
	1983	..	..	*1140	..	20	1120	55
Togo	1980	..	..	350	..	-50	400	158
	1981	..	..	*300	..	-200	500	192
	1982	..	..	*350	..	-160	510	191
	1983	..	..	*320	..	0	320	116
Tunisia	1980	5627	2092	1146	4609	555	1609	252
	1981	5407	1848	1395	4991	228	1583	241
	1982	5146	*1700	371	3748	289	1480	220
	1983	5578	*1800	*380	*4228	190	1540	224
United Rep. Tanzania	1980	..	..	508	...	...	508	27
	1981	..	..	550	...	...	550	28
	1982	..	..	*560	...	...	560	28
	1983	..	..	*560	...	...	560	27
Zaire	1980	1023	*1015	*180	*853	0	350	12
	1981	1048	*996	*160	*790	-10	428	15
	1982	1145	*1090	*140	*785	35	465	15
	1983	*1146	*1100	*110	*800	8	450	14
Zambia	1980	..	..	762	..	-30	792	140
	1981	..	..	751	..	2	749	128
	1982	..	..	*700	..	10	690	114
	1983	..	..	*700	..	0	700	112
AFRICA	1980	298335	70893	32560	244055	14145	72695	153
	1981	226232	64752	34476	170655	9350	80703	165
	1982	215985	64433	32256	147902	11838	87501	173
	1983	216368	69536	30361	146089	13676	86964	167

Production, Trade and Consumption of Natural Gas (Table 5)

(Quantities in terajoules and in megajoules per capita)

Country or area	Year	Production	Exports	Consumption Total	Consumption Per Capita
Algeria	1980	759144	*241211	517933	27746
	1981	505203	*278222	226981	11777
	1982	517876	*372000	145876	7326
	1983	515700	375000	140700	6838
Angola	1980	3000	..	3000	388
	1981	3500	..	3500	441
	1982	3500	..	3500	430
	1983	4000	..	4000	480
Congo	1980	1	..	1	1
	1981	0	..	0	0
	1982	0	..	0	0
	1983	0	..	0	0
Egypt	1980	40530	..	40530	983
	1981	53438	..	53438	1262
	1982	58322	..	58322	1343
	1983	59320	..	59320	1332
Gabon	1980	5928	*0	5928	5520
	1981	6000	*0	6000	5500
	1982	6000	*0	6000	5415
	1983	6000	*0	6000	5324
Libyan Arab Jamahiriya	1980	134377	87258	47119	15844
	1981	105390	*37155	68235	22061
	1982	424300	56585	367715	114339
	1983	384500	*60000	324500	97098
Morocco	1980	2630	..	2630	131
	1981	3705	..	3705	179
	1982	3028	..	3028	142
	1983	3130	..	3130	142
Nigeria	1980	51700	..	51700	642
	1981	200000	..	200000	2401
	1982	200000	..	200000	2322
	1983	220000	..	220000	2471
Rwanda	1980	42	..	42	8
	1981	40	..	40	8
	1982	42	..	42	8
	1983	42	..	42	7

Country or area	Year	Production	Exports	Consumption	
				Total	Per Capita
Tunisia	1980	16640	..	16640	2603
	1981	18196	..	18196	2776
	1982	19267	..	19267	2868
	1983	17540	..	17540	2550
AFRICA	1980	1013992	328469	685523	1440
	1981	895472	315377	580095	1183
	1982	1232335	428585	803750	1590
	1983	1210232	435000	775232	1489

Production, Trade and Consumption of Solid Fuels (Table 6)

(Quantities in thousand metric tons and in kilograms per capita of coal equivalent)

Country or area	Year	Production	Imports	Exports	Consumption Total	Consumption Per Capita
Algeria	1980	7	600	..	607	33
	1981	7	918	..	925	48
	1982	7	1068	..	1075	54
	1983	7	1068	..	1075	52
Burundi	1980	2	..	..	2	0
	1981	4	..	..	4	1
	1982	5	..	..	5	1
	1983	4	..	..	4	1
Cameroon	1980	...	0	..	0	0
	1981	...	1	..	1	0
	1982	...	0	..	0	0
	1983	...	0	..	0	0
Egypt	1980	..	702	16	685	17
	1981	..	1112	29	1083	26
	1982	..	1231	20	1212	28
	1983	..	1275	22	1252	28
Ghana	1980	..	2	..	2	0
	1981	..	2	..	2	0
	1982	..	2	..	2	0
	1983	..	2	..	2	0
Kenya	1980	..	18	..	18	1
	1981	..	90	..	90	5
	1982	..	33	..	33	2
	1983	..	77	..	77	4
Libyan Arab Jamahiriya	1980	..	1	..	1	0
	1981	..	1	..	1	0
	1982	..	1	..	1	0
	1983	..	1	..	1	0
Madagascar	1980	..	21	..	21	2
	1981	..	24	..	24	3
	1982	..	25	..	25	3
	1983	..	26	..	26	3

Country or area	Year	Production	Imports	Exports	Consumption Total	Consumption Per Capita
Malawi	1980	..	65	..	65	11
	1981	..	48	..	48	8
	1982	..	71	..	71	11
	1983	..	45	..	45	7
Mauritania	1980	..	6	..	6	4
	1981	..	6	..	6	4
	1982	..	7	..	7	4
	1983	..	7	..	7	4
Mauritius	1980	..	1	..	1	1
	1981	..	2	..	2	2
	1982	..	1	..	1	1
	1983	..	1	..	1	1
Morocco	1980	680	27	84	623	31
	1981	704	38	61	681	33
	1982	735	30	60	705	33
	1983	817	39	80	776	35
Mozambique	1980	400	180	280	300	25
	1981	350	200	180	370	30
	1982	380	200	160	420	32
	1983	380	200	160	420	32
Niger	1980	20	..	..	20	4
	1981	30	..	..	30	5
	1982	45	..	..	45	8
	1983	43	..	..	43	7
Nigeria	1980	176	4	0	180	2
	1981	116	4	0	120	1
	1982	63	4	0	67	1
	1983	40	4	0	44	0
S. Africa Customs Un.	1980	93379	0	23320	73691	2249
	1981	104870	0	23571	81298	2421
	1982	102281	0	20800	81481	2366
	1983	105797	0	22416	83374	2360
Tunisia	1980	..	133	..	133	21
	1981	..	165	..	165	25
	1982	..	134	...	134	20
	1983	..	133	..	133	19

Country or area	Year	Production	Imports	Exports	Consumption Total	Consumption Per Capita
United Rep. Tanzania	1980	1	0	..	1	0
	1981	1	0	..	1	0
	1982	1	0	..	1	0
	1983	1	0	..	1	0
Zaire	1980	138	180	..	318	11
	1981	140	184	..	324	11
	1982	120	188	..	308	10
	1983	130	192	..	322	10
Zambia	1980	438	0	0	510	90
	1981	427	0	0	427	73
	1982	509	0	0	509	84
	1983	381	0	0	381	61
Zimbabwe	1980	2768	104	331	2541	345
	1981	2362	69	218	2213	290
	1982	2403	79	181	2301	292
	1983	2391	34	203	2221	272
AFRICA	1980	98059	2043	24031	79725	167
	1981	109010	2864	24059	87815	179
	1982	106549	3074	21221	88402	175
	1983	109991	3104	22682	90206	173

22. Tables 2 and 3 show the actual production of oil and natural gas in metric tons and cubic feet respectively. For the same commodities two additional tables 4 and 5 are attached for the convenience of the reader. From these tables could be clearly seen that production of liquids in Africa dropped from 305.2 MTOE in 1980 to 233.3 MTOE in 1983. If the production figures of 1983 are compared to those in 1980, the average drop in production by the major producers (Nigeria, Algeria and Angola) was around 7.0 percent. In some member States (Cameroon, Egypt and Congo) the production during the same period went up in the range of 10-20 percent.

23. Production of natural gas in Africa stabilized in 1982-83 (28.9-28.4 MTOE) and it registered a slight increase compared to the figures in 1980. As the infrastructure for transporting and distributing gas in African countries is either nonexistent or in the early stages of development, time and capital requirements will constrain the build-up of these systems in the future.

24. Production of solid fuels in Africa grew steadily from 1980 to 1983. Historically in fifies coal in Africa accentuated for about 90 percent of total commercial energy production. In seventies the structure of energy mix drastically changed and coal share accounted to about 11.8 percent in the continent's production of commercial energy. Production of solid fuels in Africa (by country) is shown in Table 6.

25. Uranium production in Africa registered a significant growth during the seventies in spite of the two negative factors: gradual depletion of the deposits and non-utilization of the product on the continent. Table 7 shows uranium production in Africa.

Table 7

Production of Uranium (Uranium content)

(Quantities in metric tons)

Country	1980	1981	1982	1983
Gabon	1033	1020	970	1042
Niger	4100	4360	4259	4265
S. Africa Customs Un.	10188	10102	9591	9600
AFRICA	15321	15482	14820	14907

Production, Trade and Consumption of Electricity (Table 8)

(Quantities in million kilowatt hours and in kilowatt hours per capita)

Country or area	Year	Production	Imports	Exports	Consumption	
					Total	Per Capita
Algeria	1980	7123	...	..	7123	382
	1981	8149	...	..	8149	423
	1982	8448	...	..	8448	424
	1983	8520	...	..	8520	414
Angola	1980	1500	..	..	1500	194
	1981	1500	..	..	1500	189
	1982	1600	..	..	1600	197
	1983	1740	..	..	1740	209
Benin	1980	5	117	..	122	35
	1981	5	*120	..	125	35
	1982	5	*120	..	125	34
	1983	5	*110	..	115	30
Burkina Faso	1980	113	*0	..	113	18
	1981	115	*0	..	115	18
	1982	115	*0	..	115	18
	1983	115	*0	..	115	17
Burundi	1980	1	39	..	40	10
	1981	2	*149	..	151	36
	1982	2	*150	..	152	36
	1983	2	*140	..	142	32
Cameroon	1980	1452	..	..	1452	170
	1981	1908	..	..	1908	218
	1982	1908	..	..	1908	212
	1983	1804	..	..	1804	195
Cape Verde	1980	10	..	..	10	33
	1981	11	..	..	11	36
	1982	12	..	..	12	39
	1983	12	..	..	12	38
Central African Rep.	1980	67	..	..	67	29
	1981	67	..	..	67	29
	1982	68	..	..	68	28
	1983	68	..	..	68	28
Chad	1980	64	..	..	64	14
	1981	65	..	..	65	14
	1982	65	..	..	65	14
	1983	65	..	..	65	14

Country or area	Year	Production	Imports	Exports	Consumption Total	Consumption Per Capita
Comoros	1980	10	..	..	10	26
	1981	10	..	..	10	25
	1982	10	..	..	10	24
	1983	10	..	..	10	23
Congo	1980	155	9	..	164	107
	1981	165	*0	..	165	105
	1982	185	*26	..	211	131
	1983	185	*27	..	212	128
Djibouti	1980	117	..	..	117	377
	1981	123	..	..	123	380
	1982	126	..	..	126	376
	1983	126	..	..	126	365
Egypt	1980	18939	..	..	18939	459
	1981	21267	..	..	21267	502
	1982	21790	..	..	21790	502
	1983	23520	..	..	23520	528
Equatorial Guinea	1980	18	..	..	18	51
	1981	15	..	..	15	42
	1982	14	..	..	14	38
	1983	15	..	..	15	40
Ethiopia	1980	668	..	..	668	21
	1981	696	..	..	696	21
	1982	763	..	..	763	23
	1983	753	..	..	753	22
Gabon	1980	530	..	..	530	493
	1981	535	..	..	535	490
	1982	530	..	..	530	478
	1983	535	..	..	535	475
Gambia	1980	40	..	..	40	69
	1981	40	..	..	40	67
	1982	40	..	..	40	66
	1983	40	..	..	40	65
Ghana	1980	5317	..	440	4877	426
	1981	5382	..	472	4910	415
	1982	4982	..	521	4461	365
	1983	2589	..	*400	2189	173
Guinea	1980	500	..	..	500	103
	1981	498	..	..	498	101
	1982	498	..	..	498	98
	1983	499	..	..	499	96

Country or area	Year	Production	Imports	Exports	Consumption Total	Consumption Per Capita
Guinea-Bissau	1980	14	..	..	14	17
	1981	13	..	..	13	16
	1982	13	..	..	13	15
	1983	13	..	..	13	15
Ivory Coast	1980	1743	*0	..	1743	211
	1981	1903	*0	..	1903	223
	1982	1929	*0	..	1929	218
	1983	1932	*0	..	1932	211
Kenya	1980	1490	315	..	1805	108
	1981	1754	194	..	1948	112
	1982	1900	212	..	2112	116
	1983	2166	*179	..	2345	124
Liberia	1980	900	..	..	900	481
	1981	1100	..	..	1100	569
	1982	1100	..	..	1100	552
	1983	1100	..	..	1100	535
Libyan Arab Jamahiriya	1980	4833	..	..	4833	1625
	1981	5600	..	..	5600	1811
	1982	6000	..	..	6000	1866
	1983	7150	..	..	7150	2139
Madagascar	1980	426	..	..	426	49
	1981	427	..	..	427	48
	1982	432	..	..	432	47
	1983	450	..	..	450	48
Malawi	1980	431	..	2	429	72
	1981	425	..	2	423	69
	1982	446	..	1	445	70
	1983	486	..	1	485	74
Mali	1980	110	..	..	110	16
	1981	110	..	..	110	15
	1982	110	..	..	110	15
	1983	110	..	..	110	14
Mauritania	1980	102	..	..	102	63
	1981	102	..	..	102	61
	1982	103	..	..	103	60
	1983	103	..	..	103	58

Country or area	Year	Production	Imports	Exports	Consumption Total	Consumption Per Capita
Mauritius	1980	438	..	..	438	459
	1981	441	..	..	441	452
	1982	429	..	..	429	432
	1983	427	..	..	427	422
Morocco	1980	4924	..	...	4924	246
	1981	5597	..	...	5597	270
	1982	5996	..	...	5996	280
	1983	6010	..	...	6010	272
Mozambique	1980	14000	*130	9659	4471	370
	1981	3800	*110	2660	1250	100
	1982	3400	*100	*2151	1349	104
	1983	6425	*100	*5026	1500	113
Niger	1980	136	88	..	224	42
	1981	142	105	..	247	45
	1982	190	119	..	309	55
	1983	252	128	..	380	66
Nigeria	1980	7177	..	88	7089	88
	1981	7814	..	105	7709	93
	1982	8310	..	119	8191	95
	1983	8500	..	128	8372	94
Réunion	1980	344	..	..	344	655
	1981	389	..	..	389	730
	1982	432	..	..	432	800
	1983	430	..	..	430	785
Rwanda	1980	163	*30	*0	193	38
	1981	163	*30	*0	193	36
	1982	163	*31	*0	194	35
	1983	157	*31	*0	188	33
St. Helena	1980	2	..	..	2	400
	1981	2	..	..	2	400
	1982	2	..	..	2	400
	1983	2	..	..	2	400
Sao Tome-Principe	1980	11	..	..	11	129
	1981	11	..	..	11	126
	1982	11	..	..	11	124
	1983	11	..	..	11	120
Senegal	1980	559	..	..	559	98
	1981	599	..	..	599	102
	1982	631	..	..	631	105
	1983	631	..	..	631	102

Country or area	Year	Production	Imports	Exports	Consumption Total	Consumption Per Capita
Seychelles	1980	50	..	..	50	769
	1981	51	..	..	51	761
	1982	53	..	..	53	768
	1983	53	..	..	53	746
Sierra Leone	1980	245	..	..	245	74
	1981	268	..	..	268	80
	1982	292	..	..	292	86
	1983	292	..	..	292	84
Somalia	1980	75	..	..	75	16
	1981	75	..	..	75	15
	1982	75	..	..	75	15
	1983	75	..	..	75	14
S. Africa Customs Un.	1980	90394	9659	*130	99923	3050
	1981	104454	2660	*110	107004	3186
	1982	108961	*2151	*150	110962	3222
	1983	109185	*5026	*150	114061	3229
Sudan	1980	1000	..	..	1000	54
	1981	1000	..	..	1000	52
	1982	1010	..	..	1010	51
	1983	1010	..	..	1010	50
Togo	1980	95	176	..	271	107
	1981	133	150	..	283	109
	1982	167	159	..	326	122
	1983	173	*160	..	333	121
Tunisia	1980	2797	..	..	2797	438
	1981	3020	..	..	3020	461
	1982	3174	..	..	3174	473
	1983	3531	..	..	3531	513
Uganda	1980	650	..	*315	335	25
	1981	657	..	*210	447	33
	1982	668	..	*230	438	31
	1983	650	..	*210	440	30
United Rep. Tanzania	1980	710	..	..	710	38
	1981	715	..	..	715	37
	1982	720	..	..	720	36
	1983	705	..	..	705	34
Western Sahara	1980	77	..	..	77	570
	1981	77	..	..	77	554
	1982	78	..	..	78	549
	1983	78	..	..	78	531

Country or area	Year	Production	Imports	Exports	Consumption Total	Consumption Per Capita
Zaire	1980	4160	*0	*100	4060	142
	1981	4162	*0	*75	4087	139
	1982	4362	*0	*70	4292	142
	1983	4213	*0	*70	4143	133
Zambia	1980	9192	*20	2748	6464	1144
	1981	9852	*15	2995	6872	1178
	1982	10058	*20	3200	6878	1141
	1983	10071	20	3200	6891	1106
Zimbabwe	1980	4541	2748	*20	7269	988
	1981	4519	2995	*10	7504	985
	1982	4134	*3593	*10	7717	978
	1983	4426	*3022	*10	7438	911
AFRICA	1980	188418	13331	13502	188247	395
	1981	199928	6528	6639	199817	407
	1982	206510	6681	6452	206739	409
	1983	211421	8943	9195	211169	405

Selected Series of Statistics on Fuelwood, and Bagasse (Table 9)

Country or area	Year	Quantities in thousand cubic metres			Quantities in thousand metric tons		
		Fuelwood			Charcoal		Bagasse
		Production	Imports	Exports	Imports	Exports	Production
Algeria	1980	*1412	"	"	0	"	"
	1981	*1461	"	"	0	"	"
	1982	*1461	"	"	0	"	"
	1983	*1461	"	"	0	"	"
Angola	1980	*7468	"	"	"	"	163
	1981	*7663	"	"	"	"	163
	1982	*7663	"	"	"	"	114
	1983	*7663	"	"	"	"	196
Benin	1980	*3634	"	"	"	"	"
	1981	*3741	"	"	"	"	"
	1982	*3871	"	"	"	"	"
	1983	*3992	"	"	"	"	"
Burkina Faso	1980	6424	"	"	"	"	88
	1981	*6594	"	"	"	"	98
	1982	*6768	"	"	"	"	91
	1983	*6948	"	"	"	"	92
Burundi	1980	*3226	"	"	"	"	"
	1981	*3306	"	"	"	"	"
	1982	*3396	"	"	"	"	"
	1983	*3482	"	"	"	"	"
Cameroon	1980	*7808	"	"	"	"	183
	1981	*7994	"	"	"	"	217
	1982	*7994	"	"	"	"	228
	1983	*7994	"	"	"	"	217
Central African Rep.	1980	*2485	"	"	"	"	"
	1981	*2544	"	"	"	"	"
	1982	*2544	"	"	"	"	"
	1983	*2545	"	"	"	"	"
Chad	1980	*7181	"	"	"	"	42
	1981	*7324	"	"	"	"	65
	1982	*7477	"	"	"	"	82
	1983	*7635	"	"	"	"	83

Country or area	Year	Quantities in thousand cubic metres			Quantities in thousand metric tons		
		Fuelwood			Charcoal		Bagasse
		Production	Imports	Exports	Imports	Exports	Production
Congo	1980	*1394	"	"	"	"	36
	1981	*1431	"	"	"	"	52
	1982	*1470	"	"	"	"	93
	1983	*1509	"	"	"	"	53
Egypt	1980	*1715	1	"	"	"	2158
	1981	*1758	0	"	"	"	2145
	1982	*1801	0	"	"	"	2331
	1983	*1845	0	"	"	"	2180
Equatorial Guinea	1980	* 415	"	"	"	"	"
	1981	* 415	"	"	"	"	"
	1982	* 415	"	"	"	"	"
	1983	* 415	"	"	"	"	"
Ethiopia	1980	*26067	"	"	"	"	531
	1981	*26636	"	"	"	"	554
	1982	*27284	"	"	"	"	577
	1983	*27971	"	"	"	"	580
Gabon	1980	* 1207	"	"	"	"	46
	1981	* 1222	"	"	"	"	50
	1982	* 1222	"	"	"	"	48
	1983	* 1222	"	"	"	"	50
Gambia	1980	*870	"	"	"	"	"
	1981	*888	"	"	"	"	"
	1982	668	"	"	"	"	"
	1983	762	"	"	"	"	"
Ghana	1980	*7058	"	"	"	"	65
	1981	*7230	"	"	"	"	23
	1982	*7284	"	"	"	"	13
	1983	*7284	"	"	"	"	15

Country or area	Year	Quantities in thousand cubic metres			Quantities in thousand metric tons		
		Fuelwood			Charcoal		Bagasse
		Production	Imports	Exports	Imports	Exports	Production
Guinea	1980	*3005	"	"	"	"	65
	1981	*3080	"	"	"	"	72
	1982	*3085	"	"	"	"	72
	1983	*3085	"	"	"	"	73
Guinea-Bissau	1980	*422	"	"	"	"	"
	1981	*422	"	"	"	"	"
	1982	*422	"	"	"	"	"
	1983	*422	"	"	"	"	"
Ivory Coast	1980	*6527	"	"	0	"	372
	1981	*6738	"	"	0	"	479
	1982	*6960	"	"	0	"	556
	1983	*7192	"	"	0	"	555
Kenya	1980	*24639	"	"	"	0	1304
	1981	*25655	"	"	"	0	1206
	1982	*26758	"	"	"	0	1043
	1983	*28000	"	"	"	0	1125
Liberia	1980	4062	"	"	"	"	0
	1981	3816	"	"	"	"	0
	1982	3994	"	"	"	"	3
	1983	*4060	"	"	"	"	2
Libyan Arab Jamahiriya	1980	*536	"	"	0	"	"
	1981	*536	"	"	0	"	"
	1982	*536	"	"	0	"	"
	1983	*536	"	"	0	"	"
Madagascar	1980	*9754	"	"	"	"	378
	1981	*10033	"	"	"	"	365
	1982	*5455	"	"	"	"	284
	1983	*5455	"	"	"	"	285
Malawi	1980	11343	"	"	"	"	509
	1981	11682	"	"	"	"	577
	1982	12021	"	"	"	"	597
	1983	*12400	"	"	"	"	598

Country or area	Year	Quantities in thousand cubic metres			Quantities in thousand metric tons		
		Fuelwood			Charcoal		Bagasse
		Production	Imports	Exports	Imports	Exports	Production
Mali	1980	3943	"	"	"	"	62
	1981	4056	"	"	"	"	31
	1982	4176	"	"	"	"	18
	1983	*4293	"	"	"	"	20
Mauritania	1980	*6	"	"	"	"	"
	1981	*7	"	"	"	"	"
	1982	*7	"	"	"	"	"
	1983	*6	"	"	"	"	"
Mauritius	1980	*24	"	"	"	"	1643
	1981	*24	"	"	"	"	1989
	1982	24	"	"	"	"	2377
	1983	22	"	"	"	"	2380
Morocco	1980	1150	"	"	"	"	"
	1981	1078	"	"	"	"	"
	1982	1107	"	"	"	"	"
	1983	*1130	"	"	"	"	"
Mozambique	1980	*12306	"	"	"	"	554
	1981	12668	"	"	"	"	580
	1982	13512	"	"	"	"	411
	1983	13870	"	"	"	"	240
Niger	1980	*3199	"	"	"	"	"
	1981	*3296	"	"	"	"	"
	1982	*3396	"	"	"	"	"
	1983	*3398	"	"	"	"	"
Nigeria	1980	*70937	"	"	"	"	114
	1981	*73322	"	"	"	"	82
	1982	*75827	"	"	"	"	65
	1983	*78400	"	"	"	"	196

Country or area	Year	Quantities in thousand cubic metres			Quantities in thousand metric tons		
		Fuelwood			Charcoal		Bagasse
		Production	Imports	Exports	Imports	Exports	Production
Reunion	1980	*31	"	"	"	"	743
	1981	*31	"	"	"	"	818
	1982	*31	"	"	"	"	841
	1983	*31	"	"	"	"	710
Rwanda	1980	4520	"	"	"	"	8
	1981	4687	"	"	"	"	8
	1982	4860	"	"	"	"	7
	1983	*4860	"	"	"	"	7
St. Helena	1980	0	"	"	"	"	"
	1981	1	"	"	"	"	"
	1982	1	"	"	"	"	"
	1983	1	"	"	"	"	"
Senegal	1980	*3200	"	"	"	"	134
	1981	*3160	"	"	"	"	121
	1982	*3299	"	"	"	"	130
	1983	*3373	"	"	"	"	163
Sierra Leone	1980	*7365	"	"	"	"	0
	1981	*7565	"	"	"	"	2
	1982	*7765	"	"	"	"	10
	1983	*8002	"	"	"	"	0
Somalia	1980	*4366	"	"	"	"	114
	1981	*4606	"	"	"	"	163
	1982	*4862	"	"	"	"	179
	1983	*4978	"	"	"	"	196
Africa Customs Un.	1980	8565	"	"	0	*31	6872
	1981	8582	"	"	0	*7	7678
	1982	8582	"	"	0	*	9040
	1983	8582	"	"	0	*10	6479

Country or area	Year	Quantities in thousand cubic metres			Quantities in thousand metric tons		
		Fuelwood			Charcoal		Bagasse
		Production	Imports	Exports	Imports	Exports	Production
Sudan	1980	*33440	"	"	"	"	636
	1981	*34397	"	"	"	"	750
	1982	*35409	"	"	"	"	880
	1983	*36445	"	"	"	"	1304
Togo	1980	*535	"	"	"	"	"
	1981	*551	"	"	"	"	"
	1982	*568	"	"	"	"	"
	1983	*585	"	"	"	"	"
Tunisia	1980	*2391	"	"	"	0	"
	1981	*2447	"	"	"	0	"
	1982	*2515	"	"	"	0	"
	1983	*2576	"	"	"	0	"
Uganda	1980	*22468	"	"	0	"	49
	1981	*23179	"	"	0	"	49
	1982	*23926	"	"	0	"	49
	1983	*24694	"	"	0	"	65
United Rep. Tanzania	1980	*35157	"	"	"	*1	398
	1981	*36262	"	"	"	0	398
	1982	*37461	"	"	"	0	342
	1983	38680	"	"	"	0	378
Zaire	1980	*26433	"	"	"	"	179
	1981	*27193	"	"	"	"	196
	1982	*27981	"	"	"	"	189
	1983	*28796	"	"	"	"	190
Zambia	1980	*8541	"	"	"	"	362
	1981	*8730	"	"	"	"	333
	1982	*9023	"	"	"	"	381
	1983	*8672	"	"	"	"	430

Country of area	Year	Quantities in thousand cubic metres			Quantities in thousand metric tons		
		Fuelwood			Charcoal		Bagasse
		Production	Imports	Exports	Imports	Exports	Production
Zimbabwe	1980	5146	"	"	0	"	1167
	1981	5490	"	"	0	"	1275
	1982	5661	"	"	0	"	1307
	1983	*5470	"	"	0	"	1424
Africa	1980	392375	1	"	0	32	18975
	1981	403521	0	"	0	7	20539
	1982	410562	0	"	0	17	22358
	1983	420742	0	"	0	10	20286

Table 10

AVAILABILITY OF FUELWOOD IN AFRICA SOUTH OF THE SAHARA

		Countries with deserts and subdeserts	Countries with highly populated savannas	Countries with sparsely populated savannas	Countries with highly populated dense forests	Countries with sparsely populated dense forests	Countries with very high population density
Population in 1980: (a)total	M inhabitants	14.6	146.0	67.8	44.4	8.4	40.5
(b)rural	M inhabitants	13.1	131.4	65.0	36.5	6.2	35.7
Natural forest formations							
Forests	M ha	-	3.5	8.7	15.0	136.6	0.8
Woodlands	M ha	9.3	217.0	383.3	35.6	19.5	11.7
Shrub formations	M ha	146.0	87.5	103.5	-	-	12
Average fuelwood productivity	m^3/ha/year	0.12	0.56	0.59	2.0	3.6	0.4
Apparent availability	M m^3/year	14.6	162	256	104.7	566	10.2
Accessible volume available	M m^3/year	1.0	116.8	143	96.2	56.6	10.2
per inhabitant	m^3/inh./year	0.07	0.8	2.1	1.75	7	0.25
Plantations							
Area of non-industrial plantations	1000 ha	20	200	105	-	-	125
Total fuelwood available	M m^3/year	0.04	1.75	0.7	0.59	0.24	1.49
per inhabitant	m^3/inh./year	0.003	0.012		0.014	0.029	0.037
Other woody resources							
Total availability	M m^3/year	0	6.36				1.72
per inhabitant	m^3/inh./year	-	0.04				0.04
Total agricultural and industrial residues	M m^3/year						8
Availability per inhabitant	m^3/inh./year						0.2

Consumption of commercial energy (Table 11)

(Quantities in thousand metric tons)

Country or area	Year	Consumption Per Capita	Total	Solids	Liquids	Gas	Electricity
Algeria	1980	913	17037	417	4444	12154	21
	1981	536	10336	636	4342	5327	31
	1982	391	7795	739	3599	3423	33
	1983	429	8827	739	4756	3302	30
Angola	1980	93	717	0	554	70	93
	1981	89	705	0	530	82	93
	1982	85	694	0	512	82	100
	1983	86	716	0	514	94	109
Benin	1980	35	123	..	113	..	10
	1981	35	124	..	114	..	10
	1982	33	123	..	113	..	10
	1983	33	125	..	116	..	9
Burkina Faso	1980	23	141	0	141	..	0
	1981	21	135	0	135	..	0
	1982	21	134	0	134	..	0
	1983	21	140	0	140	..	0
Burundi	1980	9	38	1	33	..	3
	1981	13	53	2	38	..	13
	1982	11	48	3	32	..	13
	1983	12	51	3	36	..	12
Cameroon	1980	167	1426	0	1311	..	115
	1981	309	2709	1	2555	..	153
	1982	309	2777	0	2624	..	153
	1983	305	2810	0	2666	..	144
Cape Verde	1980	100	30	0	30	..	..
	1981	95	29	0	29	..	..
	1982	110	34	0	34	..	..
	1983	102	32	0	32	..	..
Central African Rep.	1980	27	62	..	57	..	5
	1981	26	60	..	55	..	5
	1982	27	64	..	59	..	5
	1983	28	68	..	63	..	5

Country or area	Year	Consumption					
		Per Capita	Total	Solids	Liquids	Gas	Electricity
Chad	1980	16	70	0	70	..	..
	1981	15	70	0	70	..	..
	1982	15	68	0	68	..	..
	1983	14	67	0	67	..	..
Comoros	1980	31	12	..	12	..	..
	1981	30	12	..	12	..	..
	1982	29	12	...	12	..	..
	1983	28	12	..	12	..	..
Congo	1980	68	104	..	95	0	8
	1981	64	100	..	92	0	8
	1982	70	113	...	96	0	16
	1983	69	114	..	97	0	17
Djibouti	1980	716	222	..	222	..	..
	1981	373	121	..	121	..	..
	1982	436	146	..	146	..	..
	1983	441	152	..	152	..	..
Egypt	1980	336	13852	471	11600	951	829
	1981	371	15698	745	12834	1254	864
	1982	390	16916	833	13835	1369	880
	1983	400	17819	861	14568	1392	998
Equatorial Guinea	1980	51	18	..	18	..	0
	1981	61	22	..	22	..	0
	1982	68	25	..	25	..	0
	1983	69	26	..	26	..	0
Ethiopia	1980	18	587	0	546	..	40
	1981	16	508	0	465	..	43
	1982	19	651	0	602	..	49
	1983	17	576	0	528	..	48
Gabon	1980	547	587	..	426	139	22
	1981	730	796	..	633	141	22
	1982	807	894	..	732	141	22
	1983	673	759	..	597	141	22
Gambia	1980	89	52	..	52	..	..
	1981	86	51	...	51	..	..
	1982	87	53	..	53	..	..
	1983	84	52	..	52	..	..
Ghana	1980	91	1040	1	629	..	409
	1981	95	1129	1	716	..	412
	1982	84	1022	1	647	..	374
	1983	66	831	1	648	..	182

Country or area	Year	Consumption Per Capita	Total	Solids	Liquids	Gas	Electricity
Guinea	1980	60	290	..	283	..	7
	1981	58	287	..	280	..	7
	1982	58	291	..	284	..	7
	1983	57	295	..	288	..	7
Guinea-Bissau	1980	37	30	..	30	..	..
	1981	35	29	..	29	..	..
	1982	34	29	..	29	..	..
	1983	34	29	..	29	..	..
Ivory Coast	1980	136	1121	..	1007	..	114
	1981	132	1125	..	977	..	148
	1982	128	1133	..	986	..	146
	1983	135	1238	..	1091	..	146
Kenya	1980	93	1567	12	1438	..	116
	1981	87	1525	62	1327	..	162
	1982	70	1277	23	1110	..	144
	1983	66	1242	53	1027	..	162
Liberia	1980	277	518	..	492	..	25
	1981	265	512	..	486	..	25
	1982	264	527	..	501	..	25
	1983	254	523	..	497	..	25
Libyan Arab Jamahiriya	1980	1689	5023	1	3917	1106	..
	1981	2071	6405	1	4804	1601	..
	1982	4343	13968	1	5338	8629	..
	1983	3929	13131	1	5516	7615	..
Madagascar	1980	67	580	15	552	..	13
	1981	52	461	17	431	..	13
	1982	46	422	17	386	..	19
	1983	40	383	18	345	..	21
Malawi	1980	40	240	45	162	..	34
	1981	36	221	33	155	..	33
	1982	34	215	49	130	..	35
	1983	31	205	31	135	..	39
Mali	1980	20	140	..	136	..	4
	1981	18	132	..	128	..	4
	1982	19	139	..	135	..	4
	1983	19	142	..	138	..	4
Mauritania	1980	123	200	4	196	..	..
	1981	117	196	4	192	..	..
	1982	117	202	5	197	..	..
	1983	114	202	5	197	..	..

Country or area	Year	Consumption					
		Per Capita	Total	Solids	Liquids	Gas	Electricity
Mauritius	1980	226	216	1	208	..	7
	1981	197	192	1	185	..	5
	1982	193	192	1	183	..	8
	1983	191	193	1	184	..	8
Morocco	1980	219	4398	429	3781	62	127
	1981	207	4292	468	3648	87	88
	1982	203	4348	485	3742	71	49
	1983	207	4572	534	3916	73	48
Mozambique	1980	89	1073	206	527	..	340
	1981	64	802	254	480	..	68
	1982	66	850	289	481	..	79
	1983	66	875	289	494	..	92
Niger	1980	35	184	14	163	..	7
	1981	36	199	21	170	..	9
	1982	39	219	31	178	..	10
	1983	40	231	30	191	..	11
Nigeria	1980	94	7555	124	5992	1213	225
	1981	133	11100	82	6137	4693	187
	1982	131	11323	46	6395	4693	189
	1983	131	11691	30	6298	5163	201
Réunion	1980	484	254	..	228	..	26
	1981	469	250	..	218	..	32
	1982	519	280	..	244	..	36
	1983	518	284	..	248	..	36
Rwanda	1980	12	63	..	47	1	16
	1981	14	73	..	57	1	16
	1982	13	73	..	56	1	16
	1983	13	73	..	57	1	15
St. Helena	1980	0	0	0	0	..	..
	1981	400	2	0	2	..	..
	1982	200	1	0	1	..	..
	1983	200	1	0	1	..	..
Sao Tome-Principe	1980	129	11	..	11	..	0
	1981	126	11	..	11	..	0
	1982	124	11	..	11	..	0
	1983	120	11	..	11	..	0

Country or area	Year	Consumption Per Capita	Total	Solids	Liquids	Gas	Electricity
Senegal	1980	132	756	..	756	..	..
	1981	133	784	..	784	..	..
	1982	133	801	..	801	..	..
	1983	110	679	..	679	..	..
Seychelles	1980	615	40	..	40	..	..
	1981	597	40	..	40	..	..
	1982	464	32	..	32	..	..
	1983	563	40	..	40	..	..
Sierra Leone	1980	56	186	0	186	..	...
	1981	67	224	0	224	..	...
	1982	48	165	0	165	..	...
	1983	45	157	0	157	..	...
Somalia	1980	65	302	..	302	..	..
	1981	74	362	..	362	..	..
	1982	71	360	..	360	..	..
	1983	69	364	..	364	..	..
S. Africa Customs Un.	1980	1892	62004	50682	10420	...	902
	1981	1985	66654	55913	10372	...	368
	1982	1925	66315	56039	10011	...	265
	1983	1944	68693	57341	10877	...	475
Sudan	1980	56	1053	0	1010	..	42
	1981	59	1132	0	1089	..	42
	1982	59	1167	0	1124	..	43
	1983	54	1108	0	1065	..	43
Togo	1980	79	200	0	184	..	16
	1981	114	296	0	282	..	14
	1982	139	371	0	356	..	15
	1983	139	382	0	366	..	16
Tunisia	1980	439	2809	92	2325	390	2
	1981	452	2965	114	2422	427	2
	1982	441	2963	92	2415	452	3
	1983	434	2984	92	2478	412	3
Uganda	1980	19	246	..	218	..	27
	1981	16	219	..	182	..	37
	1982	17	235	..	199	..	36
	1983	16	239	..	203	..	36

Country or area	Year	Consumption					
		Per Capita	Total	Solids	Liquids	Gas	Electricity
United Rep. Tanzania	1980	31	577	1	531	..	45
	1981	31	610	1	563	..	47
	1982	31	620	1	572	..	47
	1983	29	614	1	568	..	46
Western Sahara	1980	393	53	..	53	..	..
	1981	374	52	..	52	..	..
	1982	408	58	..	58	..	..
	1983	381	56	..	56	..	..
Zaire	1980	47	1352	219	795	..	338
	1981	48	1414	223	851	..	341
	1982	48	1451	212	882	..	358
	1983	47	1462	221	896	..	345
Zambia	1980	277	1566	351	676	..	539
	1981	274	1597	294	728	..	575
	1982	259	1560	350	632	..	578
	1983	244	1518	262	676	..	580
Zimbabwe	1980	390	2872	1748	555	...	570
	1981	362	2759	1522	636	...	601
	1982	340	2681	1582	490	...	608
	1983	373	2641	1528	543	...	571
AFRICA	1980	281	133598	54832	57577	16087	5102
	1981	285	139580	60395	61119	13613	4452
	1982	289	145847	60799	61808	18861	4378
	1983	287	149441	62040	64702	18192	4507

Table 12

FUELWOOD IN AFRICA (ENERGY CONSUMPTION, 1982)

Country	FUEL WOOD CONSUMPTION		Commercial Energy Consumption	Share of Fuelwood 1/
	Roundwood	Energy Equivalent		
	000 m^3	Million GJ	Million GJ	Percent
Algeria	1 461	13.7	430.7	3.0
Angola	7 663	72.0	29.3	71.0
Botswana	729	6.8	* 8.0	45.9
Burundi	3 396	31.9	21.4	60.0
Cameroon	7 994	75.1	125.4	37.5
CAR	2 544	23.9	2.9	89.2
CHAD	7 477	70.3	2.9	96.0
Congo	1 470	13.8	4.9	73.8
Benin	3 871	36.4	4.3	89.4
Equatorial Guinea	415	3.9	0.9	81.2
Ethiopia	27 284	256.5	29.9	89.6
Gabon	1 222	11.5	32.8	25.9
Gambia	923	8.7	22.6	27.7
Ghana	7 284	68.5	43.6	61.1
Guinea	3 085	29.0	12.4	70.0
Ivory Coast	6 960	65.4	74.7	46.7
Kenya	26 758	251.5	54.4	82.2
Lesotho	293	2.7	* 4.0	40.3
Liberia	3 994	37.5	22.4	62.6
Madagascar	5.455	51.3	18.0	74.0
Malawi	5 881	55.3	9.5	85.3
Mali	4 141	38.9	6.2	86.2
Mauritania	7	..	8.6	..
Mauritius	25	0.2	6.7	2.9
Morocco	1 107	10.4	184.6	5.3
Mozambique	13 302	125.0	37.2	77.0
Niger	3 396	31.9	8.2	79.5

1/ Over total energy consumption (fuelwood + commercial energy).

* Commercial energy consumption estimate.

Source: Report of the technical consultation on wood energy research and development in Africa, FAO, Rome, 1985.

Table 12

FUELWOOD IN AFRICA (ENERGY CONSUMPTION, 1982)

Country	FUELWOOD CONSUMPTION		Commercial Energy Consumption	Share of Fuelwood 1/
	Roundwood	Energy Equivalent		
	000 m^3	Million GJ	Million GJ	Percent
Nigeria	75 827	712.3	492.2	59.1
Guinea Bissau	422	4.0	1.3	75.5
Rwanda	4 860	45.7	3.4	93.1
Senegal	3 299	31.0	35.2	46.8
Sierra Leone	7 785	73.2	9.1	88.9
Somalia	4 862	45.7	15.5	74.7
Swaziland	560	5.3	* 10.0	34.6
Tanzania	37 461	352.1	26.4	93.0
Togo	568	5.3	15.8	25.1
Tunisia	2 515	23.6	118.9	16.6
Uganda	23 926	224.9	10.0	95.9
Upper Volta	6 768	63.6	5.9	91.5
Zaire	27 981	263.0	62.0	80.9
Zambia	5 219	49.0	68.4	41.7
Zimbabwe	5 666	53.3	139.8	27.6
Egypt	1 801	16.9	785.2	2.1
Libya	536	5.0	236.4	2.1
Sudan	35 409	332.8	49.7	87.0
Reunion	31	0.3	13.0	2.2
Africa	396 473	3 699.6	3 304.7	53%

1/ Over total energy consumption (fuelwood + commercial energy)

*Commercial energy consumption estimate.

Source: Report of the technical consultation on wood energy research and development in Africa, FAO, Rome, 1985.

26. Although Africa has vast resources of hydropower only a small fraction of it has been exploited to-date. In the last few years, however, the production of electricity registered a substantial growth. Thus, in 1980, the continent produced 188,418 million Kwh, and in 1983 production reached 211,421 million Kwh. Production of electricity in Africa by country is shown in the table 8.

27. There are selected series on statistics on fuelwood and bagasse production in Africa which are summarized in Table 9. In the following Table 10 availability of fuelwood in Africa south of Sahara is presented.

IV. Consumption of energy in Africa

28. Consumption of commercial energy in Africa in 1983 reached 149.4 MTOE compared to 133.6 MTOE in 1980. Consumption of commercial energy in Africa is presented in the Table 11, fuelwood consumption is shown in the Table 12.

29. The African countries found it very difficult to curtail significantly their energy consumption despite higher energy prices. The average annual growth rates of energy supply in all developing countries (real and projected) were calculated by the Conservation Commission of World Energy Conference and are presented in the table below:

Table 13

Average annual growth rates of energy supplies

(in percent)

Energy Source	Period 1960-1978		Period 1978-2000	
	Industrialized countries	Developing countries	Industrialized countries	Developing countries
Coal	1.37	4.65	2.79	3.55
Oil	5.53	8.16	0.53	5.53
Nuclear	-	-	8.74	14.04
Hydro	4.02	9.04	1.62	5.20
Total	3.98	4.52	1.91	3.95

Source: Conservation Commission, World Energy Conference, 1984.

30. Consumption of oil in Africa in 1980 was 57.7 MTOE and it was slightly increased by the year 1983 to 64.7 MTOE.

The oil consumption growth in 1985-1990 will be close to the average figure for the developing countries, e.g. 2.3 percent per annum. In this span of time oil demand in the region may reach 500 MTOE and about half of this amount of oil will be consumed by four African member States that is Algeria, Egypt, Libya and Nigeria.

31. Back in 1980, the report to the joint OAU/ECA meeting of African experts on energy held in Addis Ababa stated (para 214 and para 221). "This new situation makes any long-term forecasting of world petroleum production difficult. However, the view may be taken that Africa, except in the case of Algeria and Libyan Arab Jamahiriya will be affected, only by what may be considered as the acceptable technical limit under current exploitation conditions and by what is in most cases, the fairly restrained eagerness of the new producing countries. The rate of growth recorded so far, in fact, would not appear to give a good indication of future trends, even for the OPEC member countries. It seems unlikely that maximum crude oil production of African countries will ever exceed the limit of 452 million tons by the year 2000; on this basis proven reserves and those yet to be discovered would be sufficient for less than 65 years".

32. "It is thus very difficult to make any realistic projections of African crude oil production for the year 2000, especially if the maximum annual production of 452 million tons is taken into account. The following hypothesis as to probable future developments may perhaps, however, be adopted (rates as percentages and production in millions of tons):

Table 14

Period	Annual Average rate of growth	Production at the end of the period	Cumulative production by period
1980-1985	2.5	355.4	1,692.2
1985-1990	1.3	388.6	1,875.3
1990-2000	1.5	451.6	4,221.5

The average annual rate of growth in 20 years's time would be 1.8 percent".

33. It is of interest to note, that in 1983 actual oil production in Africa reached 233.3 million tons. Preliminary data showed that oil production in 1984 was about 240.0 million tons and it could be expected that by the end of 1985 oil production will be within the same figure. Thus, there is a deficit of about 100.0 million tons of oil unproduced by African countries because of the number of reasons.

34. If the case of Nigeria is taken it could be clearly seen that the problems in exploration programmes in this country stem directly from the oil glut and OPEC inability to produce a co-ordinated pricing and production policy. For the last three years the Nigerian oil output has been up and down.

35. For the majority of African member States incapacitated by the high cost of oil imports investment in energy remains an absolute priority. An energy policy should be designed therefore in such a way as to balance external accounts in order to maintain growth.

36. The oil industry analysts say that the organization of Petroleum Exporting Countries (OPEC) have now clearly lost its influence on the world oil market and they predict that the organization is unlikely to regain the former status before 1990.

37. This factor has an important effect on the level of petroleum exploration, exploitation and production in Africa for two main reasons. First, the glut of oil and the restrictions imposed by OPEC on the assumption that the glut will last a long time has discouraged exploration programmes. Second, the relatively depressed state of oil markets has adversely affected oil companies earnings and they have had to trim their costs drastically.

38. The present lull and relative lack of interest in petroleum activity in Africa is unlikely to last long. The majority of short-term forecasts show that demand for oil will rise slowly over next five years 1985-1990 between 1.8 and 2.3 percent per annum.

39. If this scenario is correct, there is little doubt that oil companies will once again, begin to intensify their efforts in Africa. In the meantime, there are a number of things that can be done by African governments to quicken the pace of exploration, exploitation and development of oil fields.

40. In order to reduce dependence on import of oil non-producing African countries should develop more prospecting and exploration of oil and natural gas for which large scale investment is necessary. Some member States leave the exploration for hydrocarbons to foreign companies or to public national comapnies. While exploration by private industry tends to be directed towards early economic rewards the nationally owned or parastatal enterprises may accept a long-term comprehensive programme of studies.

41. There is a possibility that exploration efforts in some African countries could result in the discovery of a number of small oil and gas fields over a short period of time. From a commercial stand point it may not be always in the interest of private companies to proceed immediately with the development of these discoveries as they are made. The African governments may have a different view and in appropriate cases should proceed with development of small oil and gas fields for domestic consumption only.

42. In the last few years petroleum development in Africa have had to be curbed as part of a scaling down of public expenditure and in order to ensure that balance of payment is not jeopardized. If the national objectives of highest priority such as energy development are to be realized in member States some of these difficulties will need to be overcome.

43. Since African countries will continue to depend on imported oil for sometime to come it is worthwhile therefore to itensify the search for hydrocarbons. Additionally, conservation measures should be stepped up in order to reduce the foreign currency requirements for oil importation.

44. The electric energy nowadays plays a vital role in the national balances of energy in African member States and the consumption of electricity in Africa closely follows the production figures.

45. The pattern of fuelwood consumption in Africa is characterized by the fact that fuelwood needs of the region are quite high and generally are between 1.0 and 1.9 cubic meters per person per year. The study on fuelwood supplies in the developing countries undertaken by FAO in 1983 forecasted that there would be an acute scarcity of fuelwood in Africa by the year 2000. Under these circumstances it is incumbent to make the necessary provisions and to plan the consumption and production of fuelwood so that the anticipated acute shortage would be minimized if not totally overcome. FAO paper observes, for example, that improving the efficiency of wood-burning applicances promises savings of 50 percent or more in consumption.

46. The current energy market in Africa is overshadowed by the constant and impending energy shortages. Recently because of the economic crisis most of the African member States experienced a substantial deterioration in their terms of trade. The economic stagnation in the developed market economies sharply reduced the demand for and prices of many raw materials and commodities exported by African member States. Both oil prices and interest rates rose dramatically, the rate of exchange of US dollar was unfavourable too, and since the increased volume of concessionary assistance did not match the increase in current account deficits, African member States had to increase their reliance in higher cost of private sector financing. This resulted in debt-service ratios increasing significantly. Finally, the restrictive adjustment-oriented policies in several developed market economies has further diminished the market for African member States who have to pay about 60 percent of their hard currency inflow for oil imports.

V. Energy Supply and Demand Outlook

a) Energy growth model

47. Today, in Africa the energy crisis has receded into the background because the economic crisis has replaced it at the front of the economic stage. The demand for energy and oil has fallen off chiefly owing to the economic recession. Despite a recent weakening in world oil prices the energy situation in a majority of African member States remain serious.

48. The rules of energy planning state that the rate of economic growth in the country determines a growth rate for energy demand. The rate of economic growth obviously depends also on African countries GNP per capita which determines the needs to be met and the investment possibilities in terms of its national financial manpower and foreign exchange resources.

49. A growth rate for energy demand can be determined from the rate of economic growth. This is expressed by the energy intensity coefficient (the consumption of energy expressed in tons of oil equivalent per thousand dollars of GNP) or by coefficient of elasticity which shows the ratio of the rate of energy growth to that of economic growth (E/GNP). From experience, it was established that the coefficient of elasticity fluctuates around 1.1 in the majority of developing countries. In African countries where non-commercial energy is usually not recorded in accounts, this coefficient is very low (0.5 - 0.6).

50. The rate of economic growth is a major factor in raising the energy intensity coefficient. If it is high it provides the financial resources for converting the energy users' infrastructures to non-oil based fuels with higher yields. The cost and time involved in installing the infrastructure of consumption for the desired forms of energy must be very carefully taken into account.

51. This is a crucial aspect of energy policy. An African country wishing to replace oil by nuclear power cannot just build power-stations; it must also have a market for the electricity. Similarly, the reason for coal production growing rapidly today in Africa is because this indigenous sources of energy could substitute imported oil.

52. Among the problems peculiar to energy planning in Africa is the problem of evaluating the consumption of non-commercial sources of energy in order to estimate at what rate commercial energy could be substituted. Without evaluating the non-commercial forms of energy, which often amount to over 50 percent of the total energy consumed, especially in rural areas, the energy balance sheets and the planning of energy demand and supply are virtually meaningless.

b) Outlook for the energy balance in 1990

53. Energy production in Africa rose steeply in the seventies and remained at almost the same level during the eighties. Energy consumption pattern in Africa is marked by the very high share of traditional non-commercial and exceptionally low share of commercial sources. In 1980, the total energy produced in Africa amounted to 401.6 MTOE and the continent consumed about 133.6 MTOE of that figure.

54. Non-commercial energy demand in sub-Saharan Africa was nearly 100.0 MTOE in 1978, representing 80 percent of the total needs and 13 percent of world non-commercial energy consumption (NCEC). This parameter will continuously grow in the future and it may reach 200-240 MTOE in the year 2020. Commercial energy consumption (CEC) will grow rapidly in the future and could be 310 MTOE in 1990, twice the figure of 1983. The substitution of non-commercial by commercial sources could be predicted. It is expected that in 1990, oil and natural gas will continue to be the major source of energy. The two commodities combined will account for 67 percent of energy consumption in the region. By 1990, the coal consumption may come down, but electric energy consumption will increase and about 1 percent of the electricity consumed will come from nuclear power stations.

55. Africa's energy supplies are now dominated by firewood accounting for 85 MTOE in 1978 and representing 70 percent of total needs. This will not change significantly in the future and the region is expected to remain the world's highest firewood consumer.

56. Under the scenario adopted for this study, oil will cover 72 percent of total needs in 1990. Natural gas, coal, nuclear power and new energies could diversify the region's supply pattern towards the end of the forecasting period, with shares of 7.0 percent for natural gas, 18.0 percent for coal and 0.3 percent for nuclear energy .

57. Apart from oil and coal, Africa's greatest energy asset is its hydropower potential. The hydropower share in total supply by 1990 will increase to 3-5 percent.

58. The Africa's share in total world energy production will remain limited to 3-4 percent by 1990.

VI. Energy policy issues

59. The aim of an energy policy is usually to obtain a secure supply at a reasonable price. These two objectives of security and price, however, are frequently conflicting.

60. For the majority of African member States incapacitated by the cost of oil imports, investment in energy remains an absolute priority. It is a well-established fact that the poorest purchasing countries in the world can no longer afford their oil. They have to allocate up to 60-70 percent of their foreign exchange resources to pay for it. An energy policy should be designed therefore, in such a way as to balance external accounts in order to maintain growth.

61. A periodic review of an energy policy's balance sheet must be undertaken in order to ascertain what the policy involves in terms of cost and return, as compared with other investment possibilities. Every energy policy necessarily involves a periodic comparison of the main long-term investment possibilities that exist for promoting national development. The final choice is a purely political one and specific to each African country.

62. These conclusions, which strongly advocate the principle of planned energy policies are no doubt more conservative than they would have been at the time of oil and energy crisis, about twenty years ago.

63. A number of energy policy issues have been identified by the ECA secretariat. Each African member States will need to consider how to resolve them in the circumstances of its country in order to:

- promote energy policies which advance both energy and environmental objectives;

- continue progress towards a more efficient use of energy by encouraging investment in economic projects and ensuring that financial and other resources are made available to support such investment;

- rapidly improve the scientific and economic basis for further increasing the use of coal in an environmentally acceptable way;

- ensure that pricing and taxation policies promote the rational use of energy and sound investment decisions in energy production;

- minimize barriers to energy trade to promote higher supply security of African member States;

- encourage proper and systematic development of manpower resources for energy planning and undertake the training programmes aimed at the improvement of energy management.

64. Major political and industrial efforts and a large investment will be required to implement these actions and to prepare the ground today for the energy sources which will be needed in Africa at the end of this century.

65. The current energy problems in Africa cannot be solved overnight. The implementation of the objectives and priorities in energy were defined by Lagos Plan of Action which noted a lack of national energy policies in most African countries and stressed the need for an integration of energy activities in overall national development planning efforts.

66. The appropriate energy policies differ among developing countries of Africa. Low income countries derive more than half of their total energy from wood and agricultural or animal wastes. But many of them depend heavily on petroleum for commercial energy and are short of the resources needed to develop their own energy supplies. One of the difficult choices African developing countries face is how to stop the rapid deforestation and soil erosion without unduly stimulating the import of crude petroleum or products. A solution would be a systematic aforestation programme, introduction of small hydropower schemes, more efficient design of cooking stoves and more use of coal.

67. There are also other energy sector support activities that African developing countries could undertake. Many of them have serious deficiencies in the area of resources identification, geologic surveys, energy planning and training of manpower. Incomplete resource identification would reduce the economic benefits a country would obtain through stepped-up development of already identified energy resources. The only way to identify hydrocarbon resources is through geological and geophysical surveys and exploratory drilling. It should be noted that since 1978 the exploration activities in African non-oil producing countries increased relatively slowly when compared to the surge in global drilling activity or even slowed down.

68. Another problem faced by African developing countries is the lack of trained manpower in the field of energy planning. While there are at present a few international energy management training programmes, national courses in African developing countries are almost non-existant. An increase of technical cooperation would go a long way to helping solve this problem through exchange of information and transfer of skills.

69. There is an area where domestic policy measures are needed in the African developing countries is in the development or strengthening of the domestic institutional framework. The channelling of additional domestic and external finance into the energy sector demands an institutional framework that can adequately respond to the evolving energy situation. There is need for personnel familiar with a variety of contractual agreements and able to negotiate arrangements between different economic entitites. An overall co-ordinating body or department may be needed not only to balance the competing energy demand of the various economic sectors but also serve as the focal point for foreign energy investment. Such an institution or body would also have to work together with the finance and/or economics ministries to spur the mobilization of domestic finance that would share in the risk inherent in exploration activities.

70. Faster energy development would necessitate speeded-up infrastrucutral development for energy sector activities. Bottlenecks in key infrastructural areas, such as transport facilities, refinery construction/expansion, petrochemical plant construction etc. can slow down the rate of energy resource development.

71. On the pricing side, maintaining domestic prices of energy resources at levels that reflect energy's real economic cost is essential to ensure that each African developing country adjusts to the evolving energy situation and that endusers are given the appropriate signals for more rational longer-term decisions. It will also encourage the more optimal use of energy resources since appropriate pricing and taxation policies of energy products will strongly encourage energy resources efficiency and conservation and interfuel substitution.

72. The energy sector requires large-scale investments which means that careful consideration has to be given to meeting future demands at the least cost, and determining priorities among various sources of supply. For any individual country, investment requirements and priorities depend on resources availability, relative costs, possibilities for substitution and market competition among fuels and the need for related investments. But though it is not possible to decide a prior optimal resource development strategy for an individual country, it was generally established that in the great majority of cases substantial savings would be gained by substituting domestic sources for imported oil.

73. It is a well-known fact that exploration for energy resources such as petroleum, natural gas and coal is a high-risk and large-scale investment enterprises. This explains why most of developing African countries (non-oil-exporters) have little or not at all capacity to undertake exploration and are therefore dependent on external sources. The impediments also include the lack of technical knowledge and skills. A solution would be to attract foreign enterprises which will undertake the exploration on an agreed basis. These enterprises need not be the major, multi-national companies; they can be nationally - owned enterprises which may acept terms more favourable to the host countries. Such terms may not be accepted by multinationals which could be interested in the areas which from a global point of view, are the most promising. We undetstand that the policy of the African Governments is to leave the exploration for primary energy resources into the hands of the private companies, sometimes parastatal, rather than hand this to their own organizations. While exploration by private industry tends to be directed towards relatively early economic rewards and thus concentrates more on intensive high-quality local surveys, the developing countries in Africa may initiate a long-termed comprehensive programme of studies.

74. However, the use of small enterprises presents the inconvenience that they are less able to insure themselves against failure by geographic diversification of their exploration activities.

75. An important role in the economic development of African countries should be played by energy efficient utilization and conservation. This issue is of great concern to all African developing countries, though the scope for energy conservation in Africa is much smaller than in developed countries. Such sectors of economy as agriculture, trade and residential rely heavily on traditional fuels and any shift from traditional to commercial fuels would place additional strain on the import bill of non-oil-producers in Africa. It is well known that no single source

of energy can meet the continent's future energy requirements. Consequently, exploration for, and development of conventional sources of energy should continue at an intensified rate along with efforts to develop new and renewable sources of energy. In following this policy, a series of recommendations have been drafted by African experts attending various meetings and forwarded as guidelines. These recommendations are as follows:

a) African policy makers should implement a comprehensive and co-ordinated energy policy taking into account the special situation of individual countries and the continent's available or potential energy resources.

b) Such a policy must be based on as complete an inventory as possible of all energy resources, their potential and possibilities for their development and use. To formulate the policy, it will be necessary to chart current or planned energy needs and catalogue energy sources able to meet those needs under the best socio-economic conditions. Energy development plans for the short, medium and long terms should be drawn up at national and subregional levels and integrated into national development plans.

c) There should be a permanent technological and political structure responsible for energy problems as a whole at both the national level and the regional and subregional levels.

d) National services should be set up in each country to design, plan and manage energy projects, co-ordination machineries and bodies should be established at the subregional and regional levels and these institutions should be given adequate funds and manpower to carry out their activities efficiently.

e) Generally, African consultancy firms should be set up, upgraded and promoted to draw up and use the inventories of the continent's energy resources.

f) The training of skilled staff at all levels and in all spheres to develop, exploit and utilize an energy resources (exploration, evaluation, planning exploitation, R & D, design and manufacture of equipment to exploit and utilize energy resources, etc.) should be considered a prerequisite and therefore be given absolute priority.

g) Special attention should be given to the development of science and technology and steps should be taken to collect, classify and disseminate this scientific and technological information more efficiently than is now the case.

h) Additional seminars, study tours and advanced training courses should be organized and possibilities should be increased for African decision makers from national and intra-African institutions concerned with the energy sector to exchange information and share experience.

i) The energy future of African countries will depend to a large extent on their ability to organize, implement and develop their own scientific and technological capacity.

VII. Energy market in Africa

76. In current eighties most of the African countries experienced a substantial deterioration in their terms of trade. The economic stagnation in the developed market economies sharply reduced the demand for and prices of many raw materials and commodities exported by African developing countries. Both oil prices and interest rates rose dramatically, the rate of exchange of US dollar was unfavourable too, and since the increased volume of concessionary assistance did not match the increase in current account deficits, developing African countries had to increase their reliance in higher cost private sector financing. This resulted in African developing countries debt-service ratios increasing significantly. Finally, the restrictive adjustment-oriented policies in several developed market economies has further diminished the market for African developing countries were able to pay in 1983 for about 60 per cent of their imports from net current inflows. The direct impact on non-oil producing African developing countries of the second increase in oil prices (1979-1980) was much harder than the first due to a larger increase in oil import bill (US$2.9 billion in 1980 against US$1.2 billion in 1974).

77. The African imports of commercial energy reached 82.5 million tons of coal equivalent which is about equal of the consumption of solid fuel in the continent. Trade of coal in Africa involve limited quantities because all production is consumed on the internal markets.

78. In Africa to-day, there are seven member States which are net oil exporting countries. The role of African oil in the world oil market can be assessed in terms of individual country's reserves and production level. This is best illustrated by Nigeria which during the last thirty years has emerged from the position of a virtual non-producer to that of sixth largest oil producer in the world today. With proved reserves of 19 billion barrel of oil (and 115 billion of potential oil reserves), Nigeria controls about 34 percent of Africa's reserves and 3.2 percent of the entire world proved reserves. It has also been estimated that Nigeria's gas potential is enormous. The great number of African member States are heavily dependent on crude oil import and in 1980, oil import bill of African non-producers reached 7.4 billion $US that is 29.2 per cent of their export earnings and 25.5 percent of their import bill. The World Bank predicted back in 1981 that the level of export petroleum prices will be determined in the longer term by the substitutes to conventional petroleum. Based on available estimates of these production costs there could be a doubling of oil prices in real terms during the next two decades. In view of oil glut OPEC oil prices dropped to $US29 per barrel and there was a speculation about another drop in price . However, the OPEC member States lowered the ceiling of oil production from 17.5 million bill a day to 16.0 million in order to reduce oil glut in the world market.

VIII. Prospects for the future

79. It is now generally accepted that the energy problems of the seventies were not passing phenomenon but the crisis marked the end of an era of cheap coal and oil and the transition to high cost energy. Over the next two decades the oil price is expected to cause significant changes in the sources of supply, a large increase in investment in energy production to reduce dependence on oil and greater efforts to make energy use more efficient.

80. Given this situation coal is likely to make a significant comeback at the world level, Africa included. The African potential resources of coal are so large and appears to be so widely distributed and its economic competitiveness with other fuels has recently improved so much, that its revival can be effected in comparatively short period of time. Coal exploration is less risky and less costly than the exploration of other fossil-fuel resources. It is therefore reasonable to expect the African countries will increase their coal resources. National energy planning efforts should therefore be oriented towards an accelerated programme of coal development.

81. The African developing countries will continue to rely heavily on oil in their domestic consumption of energy throughout the forthcoming decade. Although both groups of countries oil-importers and oil-exporters will expand their use of natural gas, in the latter group of countries the pressure to replace petroleum will be answered by increased use of primary electricity. Thus, their energy consumption will continue to rise faster than their GNP taking also into consideration a rapid growth in their population.

82. A number of oil-producing developing countries of Africa are expected to increase their output of crude oil. Angola, Cameroon, Congo and Ivory Coast are among these countries. Ghana, Morocco and Sudan are expected to be able to reduce significantly their dependence on oil import.

83. Many African countries have carried out by now hydro surveys and feasibility studies for exploiting their hydro potential, however, because of the long lead time for such projects, hydro capacity is expected to expand only slowly during this decade.

84. Unless immediate action is undertaken at national, subregional and regional levels, the future of energy development on the African continent will look as follows:

a) Most of the oil-importing developing African countries will continue to depend on petroleum as main source of energy for their industrial, transport and electrical energy generating sectors. Consequently, any economic growth will be associated with a growth in energy demand, i.e. increased demand in petroleum products and fina-ly with a continuously negative impact on the balance of payments. As a result, a number of African countries will have to reduce their consumption of petroleum products, impending thus the development of their industrial, transport and particularly agricultural sectors.

b) Development of hydropower resources will take place at a slow rate due to heavy capital investment needed for major hydroelectric schemes and lack of an inventory and know-how for the development of small hydropower schemes. On the other side, the electricity produced by thermal power stations will be less available due to the high prices of petroleum products.

c) Fuelwood and charcoal will continue to be the main source of energy for rural areas and for low to medium-income population of urban areas. Neither petroleum products, nor electricity will substitute fuelwood and/or charcoal. Consequently, consumption of fuelwood and charcoal will follow the population's growth rate and facilitate an acceleration of deforestation process in those areas of the continent which are already affected by it.

IX. Conclusions

85. A series of concrete actions should be undertaken with a view to improving the future energy situation on the continent and these can be summarized as follows:

a) Initiation or acceleration of hydrocarbons exploration within prospective areas;

b) Development and/or utilization on a larger scale of coal and lignite resources. Increase in utilization of peat and natural gas. Expanding exploration for and development of oil shales and tar sands;

c) Accelerated development of hydropower resources through multinational participation, implementation of interconnection of grids, construction of long-distance transmission lines, initiation of projects for development of small scale hydropower schemes;

d) Development of new and renewable sources of energy;

e) Establishment of a research and development base within the energy sector. Training of manpower in the field of energy, including nuclear energy through a combined programme of training aborad and the acquisition at home of small nuclear reactors for research and training purposes;

f) Setting up of an afforestation policy;

g) Establishment of national, subregional and regional institutions, with elaboration of energy development programmes integrated within the overall economic development plans and policies.

86. The energy future of African countries will depend to a large extent on their ability to organize implement and develop their own scientific and technological capacity. This could be the right time for the concentrated positive action for countries who can always rely on support of the ECA secretariat in the implementation of the national energy programmes.